Claims

1. A method for producing a conductive and transparent zinc oxide layer on a substrate by reactive sputtering, the process having a hysteresis region, characterized by the following steps:

a metallic Zn target with doping is used, the doping content of the target being less than 2.3 at-%,

the heater for the substrate is set such that a substrate temperature of greater than 200 °C is set,

a dynamic deposition rate of greater than 50 nm*m/min is set that corresponds to a static deposition rate of more than 190 nm/min, and

a stabilized operating point within the unstable process region is selected that is located between the transition point between a stable, metal process and an unstable process and the inflection point of the stabilized process curve.

2. The method according claim 1 wherein a target with a doping content of less than 1.5 at-%, particularly of less than 1 at-% is used.

3. The method according to any one of claims 1 to 2 wherein a target with aluminum as the doping agent is used.

4. The method according to any one of claims 1 to 3 wherein the substrate is heated to temperatures above 250 °C, particularly to temperatures above 300 °C.

5. The method according to any one of claims 1 to 4 wherein a dynamic deposition rate of greater than 80 nm*m/min, particularly of greater than 100 nm/min is set that corresponds to a static deposition rate of greater than 300, particularly greater than 380 nm/min.

6. The method according to any one of claims 1 to 5 wherein a dual magnetron arrangement with medium frequency (mf) excitation is used.

7. The method according to any one of claims 1 to 6 wherein a dynamic flow process is carried out, where the substrate is moved during sputtering.

8. A conductive and transparent zinc oxide layer, produced with the method according to any one of claims 1 to 7, characterized in that the content of doping agent, particularly of aluminum, in the produced oxide layer is less than 3.5 at-%, that the resistivity is less than $1*10^{-3}$ W cm, that the charge carrier mobility is greater than 25 cm^2/V s and that the averaged transmittance of 400 to 1100 nm is greater than 80%.

9. The oxide layer according to claim 8 wherein the content of doping agent is less than 3 at-%, particularly less than 2.5 at-%.

10. The oxide layer according to any one of claims 8 to 9 wherein the resistivity is less than $5*10^{-2}$ W cm.

11. The oxide layer according to any one of claims 8 to 10 wherein the charge carrier mobility is greater than 35 cm^2/V s.

12. The oxide layer according to any one of claims 8 to 11 wherein the averaged transmittance of 400 to 1100 nm is greater than 82%.

13. The oxide layer according to any one of claims 8 to 12 wherein the layer comprises aluminum as the doping agent.

14. Use of an oxide layer according to any one of claims 8 to 13 in a solar cell.

15. The use according to claim 14 in a crystalline silicon thin-film solar array.

16. The use according to claim 14 in an amorphous and crystalline silicon tandem solar array.